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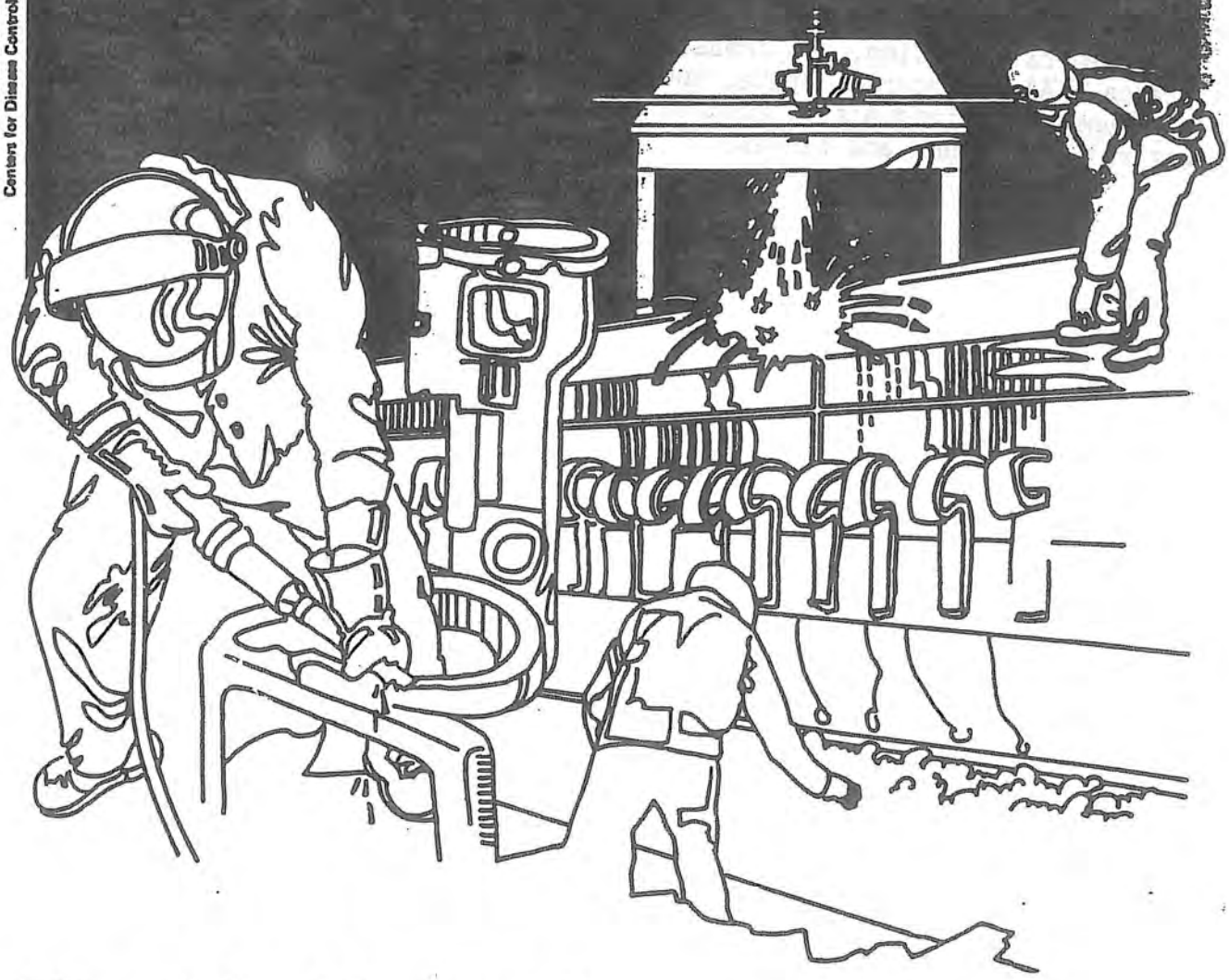

Health Hazard Evaluation Report

HETA 80-193-1081
MOLITOR INDUSTRIES, INC.
ENGLEWOOD, COLORADO

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 80-193-1081
MARCH 1982
MOLITOR INDUSTRIES, INC.
ENGLEWOOD, COLORADO

NIOSH INVESTIGATOR:
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I. SUMMARY

In July 1980 the National Institute for Occupational Safety and Health (NIOSH) received a request from a representative of Molitor Industries, Inc., Englewood, Colorado, to evaluate the potential exposure from napthalene and methyl chloroform (used in different products for dye testing research chambers) and for total chromium, manganese, and nickel, which are found in the fabrication, welding, and grinding of these chambers.

Personal time-weighted average (TWA) exposures were determined for all of the employees who work in the fabrication (welders and grinding/buffing operators) and dye testing departments during September 1981. Bulk samples were collected of the raw materials used in the processes evaluated.

The personal samples were well below the NIOSH criteria and/or the Occupational Safety and Health Administration (OSHA) standard of 1 mg/M^3 for total chromium; 5 mg/M^3 for manganese; 0.015 mg/M^3 (NIOSH) for nickel; 350 mg/M^3 for methyl chloroform; and 50 mg/M^3 for napthalene.

On the basis of the data obtained in this investigation, NIOSH determined that exposure to dye testing, welding, and grinding operators is below applicable exposure criteria for those chemicals evaluated. Therefore, based on the results of this investigation, there does not appear to be a hazard to the health of the workers studied under this request. However, recommendations concerning other health concerns are included in Section VIII of this report.

KEYWORDS: SIC 3490 (Miscellaneous Fabricated Metal Products), environmental control chambers, dye testing, naphthalene, methyl chloroform, total chromium, manganese, and nickel.

II. INTRODUCTION

In July 1980 the National Institute for Occupational Safety and Health (NIOSH) received a request from a representative of Molitor Industries, Inc., Englewood, Colorado. The request was to determine if there was a health hazard from exposures to napthalene and methyl chloroform which are used in dye products for dye testing and environmental test chambers, and chromium, manganese, and nickel materials which are found in the fabrication, welding, and grinding of test chambers. After completion of ongoing OSHA activities at the plant, NIOSH conducted an environmental survey during September 1981 to evaluate the potential exposures. The results presented in this report were given to the company and employees of concern on December 11, 1981.

III. BACKGROUND

Molitor Industries, Inc. is a diversified operation which primarily produces chambers for control of rare environmental contaminants. The various contaminants include chemical, biological, and radiological materials and, therefore, the construction of these chambers requires a variety of skills and processes in order to meet the stringent specifications of the requestor.

Included in the development of these chambers is a variety of fabricating steps, e.g., welding, grinding, and buffing, as well as dye testing the chambers (quality control) to assure that each chamber meets the specifications of the requestor. There are normally between 8-12 employees involved in the welding, grinding, and buffing of the chambers and 1-2 workers involved in the dye testing/quality control process.

A. Welding

The welding process is performed daily and normally 99 percent of the work is HELI-ARC TIG type. The remainder is primarily stainless steel using plasma torch. The electrodes used in these processes are AWS A5-18, which are mild steel electrodes containing primarily carbon and manganese, and AWS 7018, also a steel electrode which contains primarily manganese, nickel, and chromium. The personal protective equipment offered these workers is welding helmets and gloves.

B. Grinding/Buffing

There are 2-3 grinding/buffing operators and they spend the majority of their time finishing the chambers/glove boxes. These operators are provided disposable paper-type dust respirators, face shields, and aprons for personal protection.

C. Dye Testing

There are 1-2 dye test operators who perform this operation at various times depending on customer request. The average time spent depends on the size of the box. Examples are 4-5 hours for 5x5x15 foot box, 6-8 hours for a 4x9x12 foot box, and numerous days

for larger chambers. Also, it is possible that a box can be re-tested as many as 4-6 times. The sequence used in the dye testing first requires the operator to use a cleaner/remover on the metal, then a dye penetrator, and finally a dye developer. These three processes assist in identifying pin holes in the metal. This material contains primarily napthalene, methyl chloroform, and a pigment.

Due to the confined spaces these workers are often in, they are required to wear gloves, disposable coveralls, and NIOSH approved half-mask respirators with organic type cartrioges.

IV. ENVIRONMENTAL DESIGN AND METHODS

A variety of sampling techniques was used to evaluate the suspected contaminants in the various departments surveyed. Personal samples were taken on all of the dye test operators and on a portion of the welders and grinder/buffer operators. The following is a description of the techniques used:

A. Chromium, Manganese, and Nickel

A total of 12 samples were collected for these chemicals (4 for chromium, 4 for managanese, and 4 for nickel). These contaminants were sampled using 37 millimeter AA 0.8u pore density cellulose membrane filters and air drawn at a flow rate of 1.5 liters per minute with a vacuum pump. The samples were analyzed using NIOSH Methods P&CAM No. 169 for chromium and P&CAM No. 173 for the remaining metals.

B. Napthalene and Methyl Chloroform

A total of 14 samples were collected for methyl chloroform and 14 for napthalene. The contaminants were collected using charcoal tubes and low flow pumps. The pumps drew the air through the tubes at flow rates of 50 and 200 cubic centimeters (cc) per minute. The samples were analyzed by gas chromatography (NIOSH Method P&CAM No. 127).

C. Other

An evaluation of the work practices, personal protective equipment, and techniques used to exhaust and/or dilute the contaminant was also assessed in the plant during the survey periods.

V. EVALUATION CRITERIA

In this study numerous sources of environmental exposure criteria and existing research data were used to assess the worker's exposure to the suspected chemicals evaluated in the workplace at Molitor Industries, Inc.

The exposure limits to toxic chemicals are derived from existing human and animal data, as well as industrial experience, to which it is believed that nearly all workers may be exposed for an 8-10 hour day,

40-hour work week, over a working lifetime with no adverse effects. However, due to variations in individual susceptibility, a small percentage of workers may experience effects at levels at or below the recommended exposure limit; a smaller percentage may be more seriously affected by aggravation of a pre-existing condition or by development of an occupational illness.

The environmental and medical (toxicological) evaluation criteria used for this investigation are presented in Table 1. Recommended environmental limits and/or general information concerning each substance are listed, i.e., the source of the recommended limits, the present OSHA standard, and a brief description of the primary health effects known to date.

VI. ENVIRONMENTAL RESULTS

Employee exposure to suspected airborne concentrations of napthalene, methyl chloroform, total chromium, manganese, and nickel were evaluated. The following are the results and conclusions of NIOSH's evaluation:

A. Napthalene and Methyl Chloroform

A total of two personal samples for time-weighted average (TWA) and 12 samples for ceiling level were taken during the September survey for methyl chloroform. (Refer to Table 2.) These levels ranged from 0.07 - 0.13 mg/M^3 for TWA samples and 0.02 - 3.5 mg/M^3 for the Ceiling (C) level samples (values which should not be exceeded within a 15 minute period), and all of these were below the criteria of 350 mg/M^3 and (C) 350 mg/M^3. All of the napthalene samples were also below the criteria of 50 mg/M^3 established for this survey. (Refer to Table 2.)

B. Total Chromium, Manganese, and Nickel

A total of four personal samples were taken for total chromium, manganese, and nickel. Each of the samples was below the criteria established for the metals of 1 mg/M^3, 5 mg/M^3, and 0.015 mg/M^3 respectively.

VII. DISCUSSION AND CONCLUSIONS

During this evaluation it was determined that no health hazard existed to those employees who performed the welding, dye testing, polishing and/or buffing operations. This conclusion is based on the various air samples taken, evaluation of the work processes, and review of the toxicological information on those contaminants sampled.

It was felt that the dye test operators were wearing adequate personal protective gear (e.g., gloves, disposable coveralls, and NIOSH certified half-mask respirators), and this means of protecting the workers should continue. However, there were three potential health concerns that were noted during the survey which must be mentioned. First, it was noted that not all the polishing/buffing operators were wearing all of the protective equipment provided, e.g., respirator or face shields,

and it is felt that this equipment can reduce and/or eliminate potential contaminants and safety hazards to the worker. Second, not all the welding operators were wearing eye protection during the welding process. This was noted more often with someone assisting the main welder. The last concern or operation, which was not in progress during NIOSH's evaluation, is the welding of large lead plates used in the chambers or boxes. These lead plates are lined and welded into the interior of the boxes and during this lining process the welding operators may very well be receiving high doses of lead fumes. There are normally 2-3 workers involved in this process.

VIII. RECOMMENDATIONS

In view of the findings of NIOSH's environmental study, as well as personal communication with individuals at Molitor, the following recommendations are made to provide a better work environment for the concerned employees.

1. The present use of respirators, gloves, and coveralls should continue in the dye testing operation, especially an operation where the employee is required to work in confined spaces when dye testing.

2. All of the employees in the welding and grinding and buffing operations should wear all of the protective equipment provided. This would include face shields and dust-type respirators for all the grinding and buffing operators and eye protection for the welders and their assistants.

3. Based on the concern for potential exposure to lead fumes, as described earlier, it is imperative that this operation be evaluated for potential health problems. This would include not only an environmental evaluation but a medical evaluation as well, i.e., blood lead monitoring. As of December 21, 1981, Molitor has made arrangements with NIOSH to perform this evaluation (HETA 82-081).

IX. REFERENCES

1. Industrial Hygiene and Toxicology, second edition, Frank Patty (editor), Interscience Publishers, 1967, Vol. II.

2. Industrial Toxicology, third edition, Hamilton and Hardy, Publishing Service Group, Inc., 1974.

3. "Threshold Limit Values for Chemical Substances in Workman Air", America Conference of Governmental Industrial Hygienists, 1981.

4. Encyclopedia of Occupational Health and Safety, International Labor Office, McGraw-Hill Book Company, New York.

5. Industrial Ventilation, A Manual of Recommended Practice, American Conference of Governmental Industrial Hygienists, 14th Edition (1976).

6. Occupational Diseases, A Guide to Their Recognition, U.S. Department of Health, Education, and Welfare, Public Health Service Publication (NIOSH) No. 77-181.

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XI. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. Molitor Industries, Inc.
2. U.S. Department of Labor/OSHA - Region VIII.
3. NIOSH - Region VIII.
4. Colorado State Department of Health.
5. State Designated Agency.

For the purpose of informing affected employees, a copy of this report shall be posted in a prominent place accessible to the employees for a period of 30 calendar days.

TABLE 1

ENVIRONMENTAL CRITERIA AND TOXICOLOGY

Molitor Industries, Inc.
Englewood, Colorado

Substance	Recommended Environmental Limit[1]	Reference Source	Primary Health Effects	OSHA Standard
Napthalene	50 mg/M^3	ACGIH[2]	Eye and dermatological irritation; headaches; confusion.	50 mg/M^3
Methyl Chloroform -	(C) 1900 mg/M^3	NIOSH	Headaches; eye and dermatological irritation; CNS depression.	1900 mg/M^3
Total Chromium	0.5 mg/M^3	ACGIH	Histologic fibrosis of lungs.	1 mg/M^3
Manganese	(C) 5 mg/M^3	ACGIH	Nervous disorder; loss of strength; metal fume fever; dry throat.	5 mg/M^3
Nickel	0.015 mg/M^3 10 hour TWA	NIOSH	Dermatological irritation; lung cancer, allergic asthma.	1 mg/M^3

1 All air concentrations are expressed as time-weighted average (TWA) exposures for up to a 10 hour workday unless designated (C) for Ceiling which should not be exceeded.
2 ACGIH = American Conference of Governmental Industrial Hygienists.
mg/M^3 = Approximate milligrams of substance per cubic meter of air.
(C) = Ceiling level which should not to be exceeded within a 15 minute period.

TABLE 2

SUMMARY OF PERSONAL AIR SAMPLES FOR NAPTHALENE AND METHYL CHLOROFORM

Molitor Industries, Inc.
Englewood, Colorado

September 1981

Job Description	Sampling Time (minutes)	Methyl Chloroform mg/M^3	Napthalene mg/M^3
Dye Tester No. 1	390	0.13	0.046
Dye Tester No. 1	15	0.02	0.02
Dye Tester No. 1	15	0.23	0.02
Dye Tester No. 1	15	0.15	ND
Dye Tester No. 1	15	0.27	ND
Dye Tester No. 1	15	3.5	0.02
Dye Tester No. 1	15	0.67	ND
Dye Tester No. 2	390	0.07	0.032
Dye Tester No. 2	15	0.79	ND
Dye Tester No. 2	15	0.19	ND
Dye Tester No. 2	15	0.10	0.02
Dye Tester No. 2	15	0.09	0.02
Dye Tester No. 2	15	0.13	0.02
Dye Tester No. 2	15	0.22	ND
EVALUATION CRITERIA	(OSHA)	1900 mg/M^3	50 mg/M^3 (OSHA)
	(NIOSH)	(C) 1900 mg/M^3	50 mg/M^3 (ACGIH)
LABORATORY LIMIT OF DETECTION		0.01 mg	0.01 mg

ND = nondetectable
mg = milligrams
mg/M^3 = milligrams of substance per cubic meter of air
(C) = Ceiling value which should not be exceeded within a 15 minute period

TABLE 3

SUMMARY OF PERSONAL AIR SAMPLES FOR TOTAL CHROMIUM, MANGANESE, AND NICKEL

Molitor Industries, Inc.
Englewood, Colorado

September 1981

Job Description	Sampling Time (minutes)	Total Chromium mg/M^3	Manganese mg/M^3	Nickel mg/M^3
Welder	300	0.15	0.016	0.004
Welder	300	0.04	ND	ND
Polishing/Grinder	300	0.04	0.005	0.003
Polishing/Grinder	300	ND	ND	0.005
EVALUATION CRITERIA:	(OSHA)	1 mg/M^3	5 mg/M^3	0.015 mg/M^3 (NIO
LABORATORY LIMIT OF DETECTION:		5 ug	2 ug	1 ug

ND = nondetectable
ug = micrograms
mg/M^3 = milligrams of substance per cubic meter of air

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